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UNITED STATES DEPARTMENT OF AGRICULTURE
Weather Bureau
Instrument Division

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SPECIFICATIONS FOR THERMOMETERS, METEOROLOGICAL,
EXPOSED MERCURIAL,
on Corrosion Resisting Steel Backs.

1. Stems- The stems shall be of glass, about 1/4 inch in diameter (between 7/32-inch and 9/32-inch).
 2. White strip- To facilitate readings a strip of white glass shall be provided running the full length of the stem back of the bore.
 3. Bulbs- Bulbs must be cylindrical in form, not more than 2/10-inch in diameter nor longer than 7/8-inch, of clear glass of a quality that will not change appreciably with age.
 4. Neck- In order to make provision for securely tying a muslin to the bulb, a neck of smaller diameter than the bulb below or the stem above must be formed just above the junction of stem with bulb.
 5. Length- Length of stem and bulb combined must be not less than 10-1/4 nor more than 10-3/4 inches.
 6. Filling- The thermometers must be filled with pure mercury. The space not occupied by the mercury to be practically a vacuum.
 7. Terminal nib- As a provision for holding the tube in its proper relation to the back when subsequently mounted, a nib will be formed at the upper end of the stem. It must not be so long as to protrude appreciably beyond the back.
 8. Graduations- All lines, figures, and letters to be etched, clean cut and distinct. Graduations shall be to whole degrees Fahrenheit. The first and each succeeding 5 and 10 degree line to be longer than the remaining lines. Graduations to be numbered at each multiple of 10 degrees Fahrenheit, numbers below zero to be preceded by the minus sign. Figures shall be etched to the right of the bore, but in a vertical position when the stem is held horizontally with bulb to the left.
- Each tube will bear near the upper end a serial number (indicated in the order) and the initials U. S. W. B. All etchings to be filled with best quality black pigment.
9. Scale options: The approximate scale, to be specified when order is placed, will be as follows:

Minus 10 to plus 100 degrees Fahrenheit.
Minus 10 to plus 135 degrees Fahrenheit.
Minus 30 to plus 110 degrees Fahrenheit.
Minus 38 to plus 110 degrees Fahrenheit.
Or the equivalent in Centigrade.



(Exposed Mercurial)

10. Scale error.- The error at any point of the scale must be no greater than the following:

At 32° (ice point)	0.2 degree.
Above 32°	0.3 degree.
Between 32° and 12°	0.3 degree.
Below 12°	0.6 degree.

The change in the error for a distance of 10 degrees must be no greater than 0.3 degree on any part of the scale.

11. Scale length.- The scale will extend over the entire usable length of the tube, about 8 1/2 inches, and will be as open as the scale specified in the order permits. Reasonable tolerances above and below the stated limits will be allowed provided they do not produce an unduly compressed or open scale.

12. Mounting.- Each thermometer tube must be mounted upon a back consisting of a strip 1/32-inch thick by 29/32 of an inch wide by 9-1/2 inches long, made of corrosion resisting steel conforming to U. S. Navy Specifications 47S20a, dated May 28, 1934, symbol designation CRS1, mat finish.

Three holes shall be drilled through the back. At the top end of the strip a 1/8 inch hole must be drilled, with its center 1/4 inch from the top margin. On the left hand margin two holes must be drilled, each No. 36 drill, (.106 inch), the center of upper hole to be 5/32-inch from the left side of the strip and 3/8-inch below the top. The center of the lower hole to be 5/32-inch from the left side of the strip and 7-3/8 inches below the top. A corrugation not less than 1/8-inch deep, curved to fit the thermometer tube, must be formed in the back, the corrugation extending lengthwise from the lower end to the position of the terminal nib of the glass stem. At the upper end of the corrugation a suitable hole must be cut through the back to receive the terminal nib described in paragraph 7. Top of thermometer tube shall be about 1/2-inch below top of back.

13. Markings on backs- Graduation lines for each multiple of 5 degrees must be made on the backs opposite and to the right of the corresponding graduations on the stems. Appropriate numbers must be made on the back opposite each multiple of 10 degrees. The serial number of the thermometer and the letters U.S.W.B., or such identification as may be directed by other purchasing agencies, shall be placed on the left hand margin. Markings shall be filled with best quality black pigment.

14. Clamps.- The glass tubes must be secured to the backs by corrosion resisting steel straps and No. 1-72 fillister head screws, carefully and well made, and so formed as to properly fit and hold the tubes to the back. The part of the clamp passing over the tube shall be narrowed to one-sixteenth inch. Edges shall be free of burrs and other roughness.

15. Workmanship.- First class and thoroughly finished instruments are required. For example, stems must be stright and of uniform bore and



(Exposed Mercurial)

free from scratches. Lines must be clean cut and straight without ragged edges. Bulbs must be of uniform thickness and joined to the stem in a smooth and workmanlike manner. Metal parts must be free from burrs or rough edges, but not rounded nor beveled to any perceptible degree.

16. Inspection.- Each instrument will be carefully inspected and tested before acceptance; but recognizing the difficulty attending the production of a large number of thermometers that come within the limits prescribed in these specifications, it is stated that while the purchasing bureau or department will in its discretion strictly adhere to said specifications, yet it is not the intention to reject instruments inherently correct and of good workmanship, provided the greater part of the thermometers furnished come within the limits herein prescribed, and prove satisfactory throughout.

17. Ten percent rejection.- It will be understood that failure of 10% or more of the thermometers delivered to meet the specifications herein set forth will subject the entire order to rejection.

18. Prospective bidders will be required to furnish evidence of their ability to produce and deliver in the quantity required thermometers of the character indicated in the above specifications.

19. Ice Point.- There must be no change in the ice point measurable by customary methods of testing during a period of 90 days. The right is reserved to delay payment for a period of 90 calendar days for the purpose of making repeat tests to determine shift of the ice point.

B. C. Kadel,
Chief of Instrument Division.

Washington, D. C.
December 1, 1933

These specifications supersede
specifications for exposed
thermometers dated November 11, 1935.

